Abstract Submitted
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Studying gas-sheared liquid film in horizontal rectangular duct with laser-induced fluorescence technique[1] ANDREY CHERDANTSEV, Kutateladze Institute of Thermophysics, Novosibirsk, Russia, DAVID HANN, BARRY AZZOPARDI, University of Nottingham — High-speed LIF-technique is applied to study gas-sheared liquid film in horizontal rectangular duct with 161 mm width. Instantaneous distributions of film thickness resolved in both longitudinal and transverse coordinates were obtained with a frequency of 10 kHz and spatial resolution from 0.125 mm to 0.04 mm. Processes of generation of fast and slow ripples by disturbance waves are the same as described in literature for downwards annular pipe flow. Disturbance waves are often localized by transverse coordinate and may have curved or slanted fronts. Fast ripples, covering disturbance waves, are typically horseshoe-shaped and placed in staggered order. Their characteristic transverse size is of order 1 cm and it decreases with gas velocity. Entrainment of liquid from film surface can also be visualized. Mechanisms of ripple disruption, known as "bag break-up" and "ligament break-up," were observed. Both mechanisms may occur on the same disturbance waves. Various scenarios of droplet deposition on the liquid film are observed, including the impact, slow sinking and bouncing, characterized by different outcome of secondary droplets or entrapped bubbles. Number and size of bubbles increase greatly inside the disturbance waves. Both quantities increase with gas and liquid flow rates.

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Omar Matar
Imperial College London

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